

ABSTRACT OF THE DISCLOSURE

5 A semiconductor device is produced by forming a gate oxide film on a silicon substrate, forming a gate electrode on the gate oxide film, forming a nitrogen-containing oxide film on the silicon substrate and gate electrode in an N_2O gas or an NO gas, forming a BPSG film on the nitrogen-containing oxide film, and carrying out a reflow process on the BPSG film in a water vapor atmosphere. During the reflow process, the nitrogen-containing oxide film that has no hydrogen atoms prevents the penetration and diffusion of oxygen and hydrogen atoms into the silicon substrate and gate electrode, thereby preventing the oxidization of the silicon substrate and gate electrode. No hydrogen atoms diffuse into the gate oxide film, and therefore, the reliability of the gate oxide film is secured.

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